Tectonic significance of UHT Granulites from the Cauvery Shear Zone, southern India

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The *P-T-t* evolution of UHT granulites from the Cauvery Shear Zone in southern India, have significant bearings in understanding the high-grade metamorphism and lower crustal processes during Neoproterozoic-Cambrian orogeny. Garnet-kyanite rock that consist inclusions of gedrite-spinel-quartz as well as sapphirine- spinel assemblages within garnet, together mark the prograde formation of garnet from lower to higher pressure condition. Garnet surrounding gedrite reveals the later formation of garnet. The garnet-corundum-stauorlite-kyanite assemblage formed at high-pressure represents the peak metamorphism. Garnet cores have a Fe-rich composition and Mg-rich rim. The REE chemistry of zircon rims is comparable with that of garnet cores except for a significant absence of Eu. Staurolite in the investigated samples have moderate to high Mg-content which again indicates high-pressure stability. Thermodynamic modelling results show that the *P-T* peak of this gedrite-bearing granulite was at UHT conditions (*ca*. 19 kbar and *ca*. 925°C). The petrographic and phase diagrams together demonstrate the evolution of this granulite, having a tight *hairpin*-type anticlockwise *P-T* path. The U-Pb ages and REE analyses suggest that the metamorphic rims on zircon grew at *ca*. 537 ± 5 Ma, *i.e.*, in equilibrium with the garnet cores. The garnet-core-zircon equilibrium was stable during the ultrahigh-temperature condition. The Sm-Nd mineral data suggests a cooling age of *ca*. 511 Ma. The biotite in a garnet-kyanite rock has a K-Ar cooling age of *ca*. 519 Ma, which can be interpreted as the time of uplift. Comparison of the present results with other published petrographical and geochronological datasets from the Cauvery Shear Zone enables to determine a realistic *P-T-t* evolution of this terrene during Neoproterozoic-Cambrian orogeny.